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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Takemori Takayama

04005/LH

3234

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7590

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FRISHAUF, HOLTZ, GOODMAN & CHICK, PC

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EXAMINER

YEE, DEBORAH

ART UNIT

PAPER NUMBER

1793

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/790,931

Applicant(s)

TAKAYAMA ET AL.

Examiner

Deborah Yee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-15,17-20 and 22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-15,17-20 and 22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date See Continuation Sheet.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :10-29-07;8-31-07;8-30-07;8-31-07;5-23-07;4-2-97.

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement filed August 30, 2007 and April 2, 2007 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. It has been placed in the application file, but the information referred to therein has not been considered.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1, 10, 18 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 1 recites "cementite containing Cr solid-dissolved" which is indefinite since invention is trying to avoid solid-dissolved Cr in cementite.

5. Claim 1 recites 0.25 to 0.8 wt% C in case-hardened layer whereas claim 9 recites 0.5 to 1.5 wt%C. Perhaps claim 1 should recite -0.25 to 0.8 wt% solid-dissolved C".

6. Method claim 18 appears to be incomplete since first heat treating step can be performed followed by a second heat treating step at a lower temperature but no cooling step is recited.

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7. Method claim 19 recites "...slow cooling or cooling to a temperature equal to or lower than the A1 temperature and then reheating to a temperature equal to or higher than the A1 temperature" which is indefinite because cooling can't be performed at A1 temperature and then reheated at A1 temperature.

11. Claim 10 recites "martensite phase being previously a ferrite phase and containing 0.25 to 0.8 wt% carbon" is indefinite since parent claim 1 recites a steel material containing 0.45 to 1.5 wt% C. Perhaps claim 10 should be amended to recite solid-dissolved carbon.

12. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

13. Claims 1, 3 to 15, 17 to 20 and 22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

14. Claims 1, 11, 12 and 17 and its dependent claims recite the formula " $0.55 \leq \text{Cr wt\%} / \text{C wt\%} \leq 1.2$ ", which clearly raises a new matter issue since no clear descriptive support exists for this equation in the original disclosure. It was submitted that support for equation is shown by the paragraph bridging pages 17 and 18 and the first full paragraph on page 20 of the present specification base on the teaching that when the C content is 0.55 wt%, the Cr content is 0.3 wt% or more; and when the C content is 1.5

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wt%, the Cr content is 1.8 wt% or less. Formula is derived by  $0.55 \leq \text{Cr wt\%/Cwt\%} \leq 1.2$  where in the constant 0.55 is obtained by  $0.3/0.55$  and the constant 1.2 is obtained by  $1.8/1.5$ . Formula does not define the invention since  $0.3/0.55 = 0.545$ . Moreover the constant 1.2 is base on a Cr content of 1.8 yet the claimed steel material has a recited upper Cr limit of 1.5 wt%. Also first paragraph on page 20 of Applicants' specification discloses, "The amount of Cr when 0.53 to 1.5 wt% carbon is added, is preferably adjusted to 1.8 wt% or less". Hence formula base on 1.8/1.5 is only one ratio out of many others that could be derived from Applicants' broad C and Cr ranges, e.g.  $1.8/0.53 = 3.39$ . Moreover, examples in Table 2 to 4 in Applicants' specification that are representative of the present invention do not all meet the newly claimed formula.

### ***Double Patenting***

15. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

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16. Claims 1 and 3 to 15, 17 to 20 and 22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of copending Application No. 10/790,959. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the reasons stated in the previous office action dated 12-08-05.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim 15 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 14. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). Note claim 14 recites the same compressive residual stress of 50 kgf/mm<sup>2</sup> or more on tooth profile surface layers as recited by claim 16. A "tooth bottom" as recited by claim 14 would be equivalent to "end of the teeth" as recited by claim 15.

***Claim Rejections - 35 USC § 103***

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. Claims 1, 3 to 7, 17 to 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monma et al (US Patent 3,63,314) in view of Choe et al (US Patent

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Publication 2002/0029597) for the reasons set forth in the previous office action dated March 1, 2007.

***Response to Arguments***

19. Applicant's arguments filed August 30, 2007 have been fully considered but they are not persuasive.

20. In regard to Monma, it was submitted that prior art bearing steel is entirely heated in a furnace followed by quenching and tempering and base on prior art steel composition there is a high risk for distortion during quenching or quench cracking. It is the Examiner's position that this is merely Applicants' statement with no convincing evidence (e.g. comparative test). Note that Monma heats steel for 30 minutes at 810 to 870C followed by quenching to form a martensitic hardened surface similar to present invention containing carbide (cementite) within claimed range 2 to 18% by volume with a size of 0.6 microns within the claimed range of 0.1 to 1.5 microns, and containing dissolved carbon within the claimed range of 0.25 to 0.8 wt%.

21. Moreover, even though Monma does not teach examples that meet the claimed Cr/C equation, such would not be a patentable consideration since equation is new matter.

23. It was noted that Monma does not teach Cr concentration in cementite at 2.5 to 10 wt%, retained austenite and/or pearlite as recited by one or more of Applicants' claims but such properties would be expected since composition and process limitations are closely met. See lines 5 to 20 of column 5 wherein steel is subjected normalizing (normalizing is defined as heat treating in austenitic temperature range A1 or higher



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followed by air cooling) and is equivalent to Cr concentration heat treatment step recited by claim 18), spheroidize annealing and case hardening by austenitizing, oil quenching and tempering.

24. Although prior austenite grain size of ASTM 10 or higher recited in Applicants' claim 6 is not taught by Monma, such would not be a patentable difference since it is merely an intermediate property to produce a final product property which is martensite.

25. In view of further consideration, Claims 8 and 9 are patentable over Monma. Note Monma does not teach or suggest a steel material containing 0.3 to 1.5 wt% Ni with 0.25 to 1.5%Al as recited by claim 8 or 0.05 to 0.2 wt% in total of Ti, Zr, Nb, Ta and/or Hf and one or more compounds selected from the group consisting of the carbides, nitrides and carbonitrides of said alloy elements, said compounds having an average particle diameter of 0.1 to 5 microns and are dispersed within the steel material as recited by claim 9. Moreover, claims 10 to 15 are patentable over Monma since prior art fails to teach or suggest a case-hardened gear wherein the DI value  $\leq 0.12 \times M + 0.2$  with martensite phase being previously a ferrite phase containing 0.25 to 0.8 solid dissolved carbon. Limitation is critical to restrict occurrence of quench cracking and generation of tensile residual stress as evident by pages 27 and 28 of Applicants' specification.

26. The 103 rejection base on EP'723 has been withdrawn in view of Applicants' arguments. EP'723 is directed to a steel rolling element subjected to case hardening by carbonitriding or carburizing followed by reheating surface layer within the austenite temperature region of steel to disperse a granular carbide under a carburizing and/or

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carbonitriding atmosphere, while dispersing a nitride and/or carbonitride created from nitrogen and carbon which have been diffusely permeated and thereafter, the steel is rapidly cooled to form martensite phase. In contrast, present invention claims are directed to a steel rolling element subjected to a Cr concentration treatment step by heating at A1 to 900C or 300C to A1 temperature to obtain an average Cr concentration of 2.5 to 10 wt% in the cementite dispersed in the steel followed by induction heating and subsequent cooling, and low-temperature tempering to produce a case-hardened surface comprising a martensite parent phase with 2 to 18 % by volume of cementite containing Cr and 0.25 to 0.8 wt% solid dissolved carbon.

### ***Conclusion***

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Deborah Yee whose telephone number is 571-272-1253. The examiner can normally be reached on monday-friday 6:00 am-2: 30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Deborah Yee/  
Primary Examiner  
Art Unit 1793

/DY/